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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/606,665	06/26/2003	Zahi A. Fayad	11006-012001	4805

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EXAMINER
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JASANI, ASHISH S

ART UNIT	PAPER NUMBER
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3737

DATE MAILED: 04/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/606,665	<b>Applicant(s)</b> FAYAD ET AL.	
	<b>Examiner</b> Ashish S. Jasani	<b>Art Unit</b> 3737	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 June 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/24/03</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 – 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pan (PGPUB 2003/0069493) in view of Yarnykh et al. (PGPUB 2004/0181146).

Pan teaches that "the invention includes a technique for efficient multi-slice fast spin echo image acquisition with black blood contrast in cardiac imaging. The technique includes applying a non-selective inversion pulse, followed by a re-inversion pulse that is slice-selective over a region encompassing a plurality of slice selections. Execution of a series of RF excitation pulses with fast spin echo readout is timed such that signal from blood is near a null point before acquiring data for each spatial slice. For greater contrast consistency, the flip angles for the excitation pulses occurring before the null point can be reduced, and those occurring after the null point can be increased" (abstract). Pan also teaches "The pulse sequence 20 of the present invention is similarly triggered by the start of an R-R interval 22 and includes a preparation sequence 24 that includes a non-selective inversion pulse 24a applicable across a slab of slices to invert spins in a longitudinal direction across the entire slab of slices having a predefined thickness. The non-selective inversion pulse 24a is immediately followed by a slice-selective re-inversion pulse 24b applicable to at least a number of the slices

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in the slab of slices excited by the non-selective inversion pulse 24a" (§ 25, lines 1 – 10). Pan also teaches "It is noted that the sequence 20 can acquire data across either one R-R interval, or multiple R-R intervals" (§ 27, lines 1 – 2). Pan does not teach of performing more than one dual inversion recovery sequence within a single R-R interval.

Yarnykh teaches of a "multi-slice double inversion recovery (DIR) pulse sequence with read out of a signal for imaging successive slices implemented on a magnetic resonance image scanner. In the method, when the DIR pulse sequence is applied before imaging each slice, a slab-selective inversion re-inverts the entire slab that includes all of the slices. All slices are imaged within a predefined repetition time (TR). The number, N, of slices acquired per TR controls the inversion time to execute the read out of the signal for imaging each slice at a zero-crossing point of blood" (abstract). Yarnykh also teaches in *Figure 1*, that acquisition takes place between successive DIR sequences. In *Table 1*, Yarnykh teaches of a *TI* time of 190 ms and 146 ms. Yarnykh also teaches of "a double-inversion block consisted of a 0.8 ms rectangular non-selective pulse, and a slice-selective adiabatic hyperbolic-secant pulse with a duration of 8.64 ms" (§ 29, lines 4 – 7). Yarnykh also teaches that "it is also noted that the machine instructions will cause processor 36 to determine the appropriate PAD interval, based upon the *TI* and number of slices to be imaged per slab, so as to ensure that the blood magnetization is passing through or approaching zero when the signal for imaging each successive slice is acquired" (§ 47, lines 15 – 19). Yarnykh also teaches that "an application of particular interest could be cardiac imaging, where cardiac gating

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is absolutely necessary. Non-gated acquisition was used in the present study, because this technique provided excellent blood suppression and image quality without gating. Gating, however, may limit a potential time performance of this method, because the time interval  $TR/N$  (see FIG. 1) cannot be shorter than one cardiac cycle (RR interval), if the acquisition for each slice corresponds to the same cardiac phase. In such a situation, a benefit of the multi-slice method could be the acquisition of 2-4 slices per cardiac phase instead of only one slice as is possible with conventional DIR" (§ 42, lines 9 - 19).

It is obvious to one skilled in the art at the time of the invention to combine the Pan gated multislice cardiac image apparatus and method with the Yarnykh multislice black-blood imaging sequence. Acquiring multiple readouts between DIR sequences will allow for shorter overall acquisition time for high resolution cardiac imaging. Yarnykh teaches of nominal DIR sequence length,  $Tl$  time, and multiple readouts will keep the time between successive DIR sequence under about 500 ms.

### **Conclusion**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ashish S. Jasani whose telephone number is 571-272-8025. The examiner can normally be reached on Mon. - Fri. 9:30 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on (571) 272 - 4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ASJ

  
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